

## A collection of phytoseiid mites (Acari: Phytoseiidae) from Java with description of a new species

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**Abstract** — Eight species of the mite family Phytoseiidae are reported from West Java, Indonesia. *Indoseiulus santosoi* sp. nov. is described and figured from a fabaceous climbing plant at Cianjur. *Euseius ovalis* (Evans), *Paraphytoseius seychellensis* Schicha & Corpuz-Raros, *Indoseiulus armellae* (Schicha & Gutierrez), and *Phytoseius (Dubininellus) rachelae* Swirski & Shechter are recorded for the first time in Java. Redescriptions are given of *I. armellae* and a previously recorded species, *Flagroseius euflagellatus* (Karg).

**Key words** — Acari, *Flagroseius*, Indonesia, *Indoseiulus*, Java, new species, Phytoseiidae

### Introduction

Prior to this work 18 species belonging to the mite family Phytoseiidae were recorded from Java, as listed below.

Berlese (1914): *Amblyseius aequipilus* Berlese 1914, *A. caudatus* Berlese 1914.

Oudemans (1930): *Typhlodromus similis* (Koch 1839).

Evans (1953): *Typhlodromus asiaticus* Evans 1953, *T. finlandicus* Oudemans 1915, *T. longispinosus* Evans 1952.

Oomen (1982): *A. deleoni* Muma & Denmark 1971, *A. largoensis* (Muma 1955), *A. syzygii* Gupta 1975, *A. tamatavensis* Blommers 1974, *Phytoseius crinitus* Swirski & Shechter 1961, *T. jackmickleyi* De Leon 1958, *T. ndibu* Pritchard & Baker 1962.

Karg (1983): *Proprioseiopsis (Flagroseius) euflagellatus* Karg 1983.

Karg & Oomen-Kalsbeek (1987): *A. (Scapulaseius) stilus* Karg & Oomen-Kalsbeek 1987, *A. (Typhlodromalus) brevibrachii* Karg & Oomen-Kalsbeek 1987, *A. (Typhlodromalus) vertunculus* Karg & Oomen-Kalsbeek 1987, *A. (Typhlodromips) quadridens* Karg & Oomen-Kalsbeek 1987.

The present paper is concerned with a small collection of phytoseiid mites, one of which is described as new and 4 are first recorded from Java. Most of the materials were collected from economic plants in West Java by Dr. T. Gotoh during August of 2004; and some additional specimens were offered by Dr. S. Santoso.

The setal nomenclature generally follows that of Rowell et al. (1978) for the dorsal surface and Chant & Yoshida-Shaul (1991) for the ventral surface of the idiosoma. The generic and subgeneric concepts adopted in this paper generally follow those of Ehara & Amano (1998, 2004). The measurements are given in micrometers (µm). Most of the present specimens, including the holotype of the new

species, will be retained in the Museum Zoologicum Bogoriense, Bogor, Java (MZB).

Subfamily AMBLYSEIINAE Muma

*Neoseiulus longispinosus* (Evans 1952)

*Typhlodromus longispinosus* Evans 1952, p. 413, figs. 1, 2 (type locality: Bogor, Java, Indonesia; type habitat: *Manihot utilissima* Pohl).

*Neoseiulus longispinosus*: Gupta 1978, p. 334; Beard 2001, p. 85, fig. 6e–g; Moraes et al. 2004a, p. 129.

*Amblyseius (Neoseiulus) longispinosus*: Ehara 2002a, p. 29, fig. 1; Ehara 2002b, p. 125.

The female of *N. longispinosus* has often been confused with that of *N. womersleyi* (Schicha 1975) (e.g., Ehara 1958, Collyer 1982). However, it is distinguished by having seta S5 about one third the length of S4, as opposed to slightly shorter than S4 in the latter, and by the shorter distance between ventrianal solenostomes (Schicha 1975). Later the “Japanese *longispinosus*” was accurately referred to as *womersleyi* (Ehara et al. 1994; Ehara & Amano 1998, 2004), whereas the true *longispinosus* has not been found to occur in Japan. This correction was overlooked in Moraes et al. (2004a).

*Specimens examined*. Cianjur: 19♀ & 1♂, 28–VII–2004 (S. Santoso), on a fabaceous climbing plant; Bogor: 4♀, 7–VIII–2004 (T. Gotoh), on cassava; Cipanas: 1♀, 7–VIII–2004 (T. G.), on rose.

*Distribution*. Korea, China, Taiwan, Thailand, Malaysia, Philippines, Indonesia (Java, Sumatra), India, Pakistan, Sri Lanka, Papua New Guinea, Australia, New Zealand, etc.

*Amblyseius tamatavensis* Blommers 1974

*Amblyseius (Amblyseius) tamataensis* Blommers 1974, p. 144, figs. 6–12 (type loc.: Ivoloina, near Tamatave, Madagascar; type habitat: *Citrus (Papeda) hystrix* De Candolle); Ehara 2002a, p. 33, figs. 7–14; Ehara & Amano 2002, p. 322, fig. 3. *Amblyseius tamatavensis*: Schicha 1981, p. 40; Schicha 1987, p. 54, pl. 16; Ueckermann & Loots 1988, p. 76, figs. 241–255; Denmark & Muma 1989, p. 13, figs. 37–43; Moraes et al. 1991, p. 119; Schicha & Corpuz-Raros 1992, p. 36, pl. 11; Ehara & Amano 2004, p. 17.

The female of *A. tamatavensis* is provided with the nearly pentagonal ventrianal shield. This species is distinctive among its congeners in that the spermathecal calyx is tubular, somewhat dilated proximally, the atrium is incorporated into the base of the calyx, and the junction between the atrium and major duct is more or less constricted, the latter approximately as wide as calyx. *A. tamatavensis* was previously recorded from Java (Oomen 1982).

*Specimens examined.* Cianjur: 9♀ & 2♂, 28–VII–2004 (S. S.), on a fabaceous climbing plant; Cipanas: 4♀, 7–VIII–2004 (T. G.), on hibiscus; Bogor: 1♀, 8–VIII–2004 (T. G.), on papaya.

*Distribution.* Japan (Ishigaki I.), Taiwan, Malaysia,

Singapore, Indonesia (Java), Philippines, Sri Lanka, Papua New Guinea, Australia, New Caledonia, New Hebrides, Fiji, Samoa, Madagascar, Africa, Cuba, Brazil, etc.

Genus *Flagroseius* Karg 1983

*Proprioseiopsis* (*Flagroseius*) Karg 1983, p. 305.

*Flagroseius*: Chant & McMurtry 2005, p. 19.

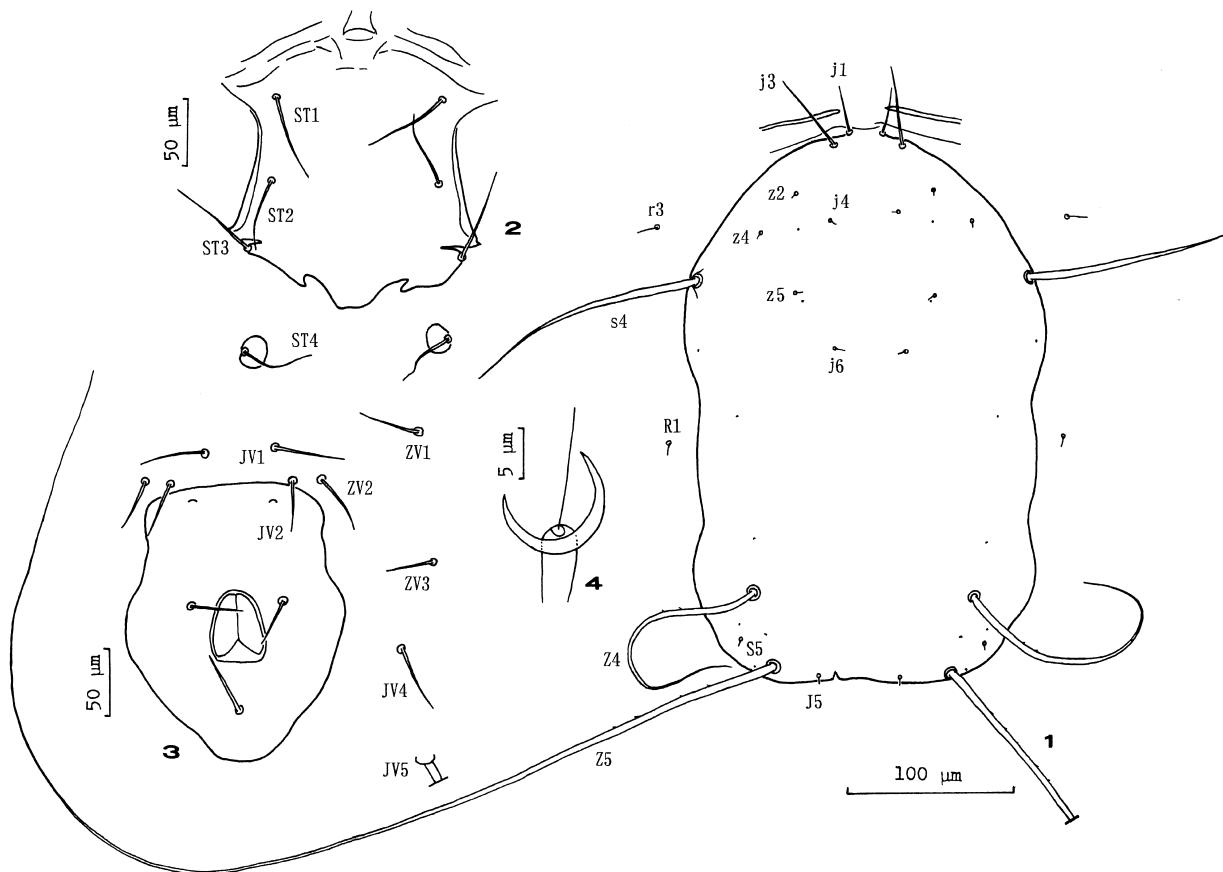
Type species: *Proprioseiopsis* (*Flagroseius*) *euflagellatus* Karg 1983, by original designation.

Female with 14 pairs of dorsal setae on idiosoma (Fig. 1); j5, J2, Z1, S2 and S4 absent; s4 and Z4 stout, very long and flagellate; Z5 stout, ultralong and flagellate. Sternal shield protruded posteriorly (Fig. 2). Ventrianal shield without preanal setae; JV1, JV2 and ZV2 located on interscutal membrane (Fig. 3), along with JV4, JV5, ZV1 and ZV3. Spermatheca with cup-shaped calyx (Fig. 4). Macrosetae on legs I, III and IV stout, very long (Figs. 5, 7, 8).

Only the type species belongs to the genus *Flagroseius*.

*Flagroseius euflagellatus* (Karg 1983)  
(Figs. 1–8)

*Proprioseiopsis* (*Flagroseius*) *euflagellatus* Karg 1983, p. 305,



Figs. 1–4. *Flagroseius euflagellatus* (♀). — 1, dorsal shield; 2, sternal shield; 3, ventrianal shield; 4, spermatheca.

fig. 4 (type loc.: Gambung, Java, Indonesia; type habitat: tea); Karg 1989, p. 202.

*Proprioseiopsis euflagellatus*: Moraes et al. 1986, p. 114; Moraes et al. 2004a, p. 175.

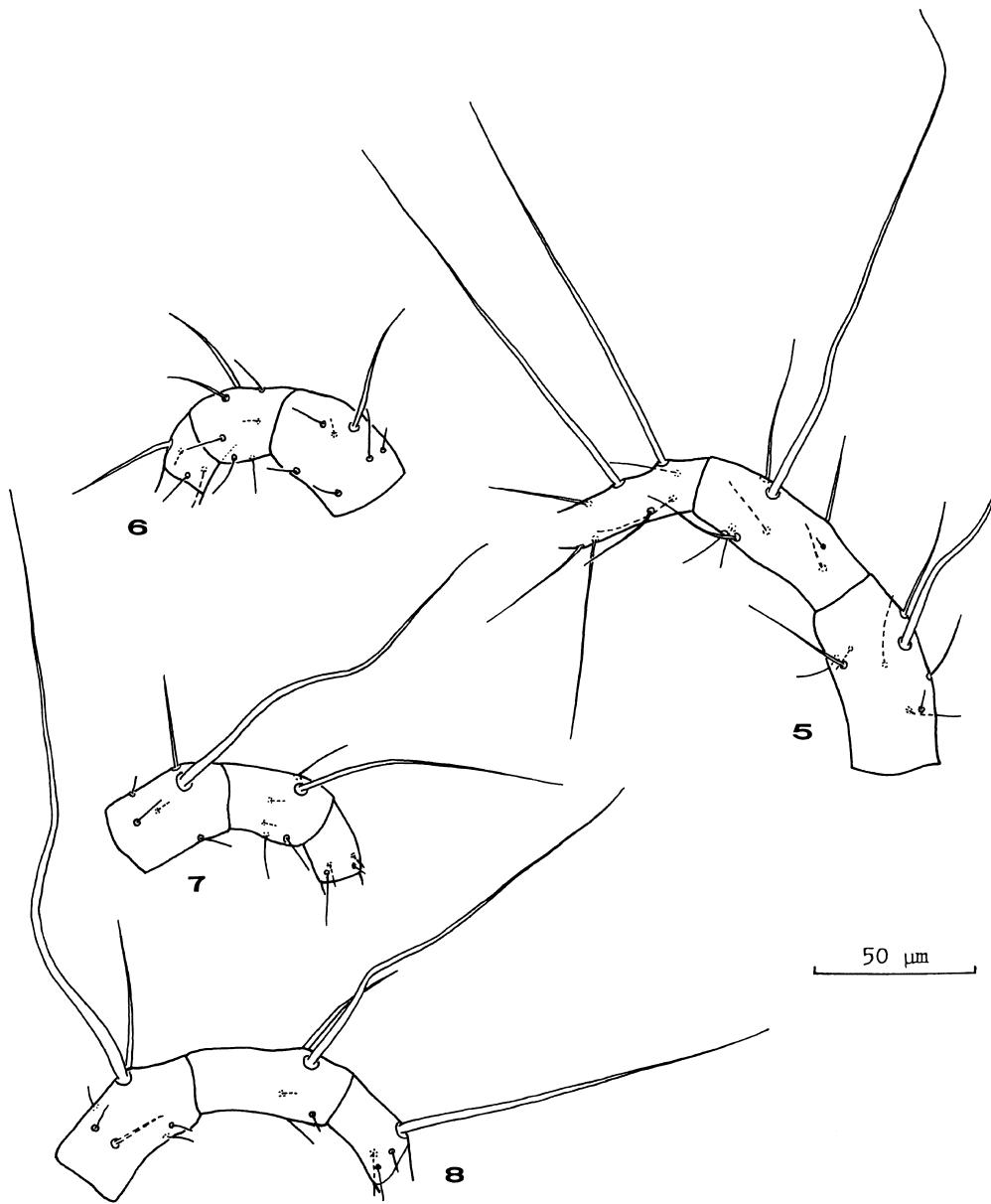
*Flagroseius euflagellatus*: Chant & McMurtry 2005, p. 19, figs. 61–67.

*Amblyseius mahabaeus* Schicha & Corpuz-Raros 1992, p. 29, pl. 1 (type loc.: National Botanic Gardens, Siniloan, Laguna, Philippines; type habitat: *Astronia cumingiana* Vidal Phan.). Synonymy by Chant & McMurtry (2005).

**Female.** Dorsal shield (Fig. 1) smooth, with 8 pairs of solenostomes. Setae on dorsal shield: 12 pairs in number; s4 very long and flagellate, smooth; Z4 very long and flagel-

late, with minute barbs sparsely; Z5 ultralong, flagellate, with minute barbs sparsely; j1 and j3 longer than j4, j6, J5, z2, z4, z5 and S5, which are minute; setae j5, J2, Z1, S2 and S4 absent (characteristic of *Flagroseius*). Seta r3 much longer than R1, both setae smooth. Peritreme extending forward to near base of seta j1; peritrematic shield with slender posterior termination.

Sternal shield with 3 pairs of setae, the posterior margin with a median protrusion (Fig. 2); seta St4 on metasternal shield. Ventrianal shield with pair of conspicuous solenostomes, without preanal setae (Fig. 3). Metapodal shields not found. Setae JV1, JV2 and ZV2 present anterior to ventrianal shield. Spermatheca (Fig. 4) with calyx cup-shaped, directly connected with nodular atrium; major duct



**Figs. 5–8.** *Flagroseius euflagellatus* (♀). — 5, leg I (genu, tibia and proximal part of tarsus); 6, leg II (ditto); 7, leg III (ditto); 8, leg IV (ditto).

conspicuous. Dentition of chelicera not observable because of angle.

Chaetotaxic formula: genu II, 2-2/0, 2/0-1; genu III, 0-2/1, 2/0-1. Leg I (Fig. 5) with 1 flagellate macroseta each on genu and tibia, that on tibia much longer; tarsus I with 2 erect, very long macrosetae near base; leg II (Fig. 6) with 1 macroseta each on genu, tibia and basitarsus; leg III (Fig. 7) with 1 very long, flagellate macroseta each on genu and tibia; leg IV (Fig. 8) with 1 very long, flagellate macroseta each on genu, tibia and basitarsus.

Measurements (single specimen): length of dorsal shield 336, width of dorsal shield 220; lengths of setae: j1 34.4, j3 50.6, j4 not measured, j6 5.9, J5 5.3, z2 4.0, z4 4.0, z5 6.5, Z4 167.0, Z5 738.0, s4 146.0, S5 7.1, r3 14.4, R1 7.5, JV5 138.0; macrosetae on leg IV: genu 192.5, tibia 131.0, basitarsus 117.0.

*Specimen examined.* Bogor: 1♀, 2-VIII-2004 (T. G.), on papaya.

*Distribution.* Indonesia (Java), Philippines.

*Remarks.* *Flagroseius euflagellatus* is characterized by having seta Z5 ultralong and j5 absent. As far as my examination goes, seta s4 is slightly shorter than Z4, whilst in previous papers the former was described as being longer than the latter.

#### *Euseius ovalis* (Evans 1953)

*Typhlodromus ovalis* Evans 1953, p. 458, figs. 5, 6 (type loc.: Kuala Lumpur, Malaya; type habitat: rubber).

*Amblyseius (Amblyseius) ovalis:* Ehara 1966, p. 24; Ehara 1967, p. 74, figs. 25-30.

*Amblyseius ovalis:* Schicha 1977, p. 127, figs. 28-34; Schicha 1987, p. 79, pl. 34; Schicha & Corpuz-Raros 1992, p. 41, pl. 18.

*Euseius ovalis:* Gupta 1978, p. 335; Wu et al. 1997, p. 117, fig. 85; Ehara & Amano 2004, p. 19.

*Amblyseius (Euseius) ovalis:* Ehara & Amano 1998, p. 43, fig. 36.

The female of *E. ovalis* is readily recognized by the relative lengths of setae j1, j3, s4 and Z5, and the slender calyx of the spermatheca. The setal lengths of this species were discussed by McMurtry & Moraes (1985) and Moraes et al. (2004b).

*Specimens examined.* Cipanas: 1♀, 7-VIII-2004 (T. G.), on rose; Bogor: 7♀ & 3♂, 8-VIII-2004 (T. G.), on papaya.

*Distribution.* Japan (Okinawa I., Ishigaki I.), China, Taiwan, Philippines, Malaysia, Indonesia (Java, new record; Sumatra), India, Sri Lanka, Mauritius, Mexico, Hawaii, Fiji, Cook Islands, Papua New Guinea, Australia, New Zealand.

#### *Paraphytoseius seychellensis* Schicha & Corpuz-Raros 1985

*Paraphytoseius seychellensis* Schicha & Corpuz-Raros 1985, p. 71, figs. 19-25 (type loc.: Casse-Dent-Mahe, Seychelles; type

habitat: *Asystasia coromandeliana* Nees); Schicha 1987, p. 165, pl. 121; Beard & Walter 1996, p. 237, figs. 1-10; Ehara 2002b, p. 130, figs. 28-36; Moraes et al. 2004b, p. 151.

*Paraphytoseius orientalis* (nec Narayanan, Kaur & Ghai 1960): Chant & McMurtry 2003, p. 220; Moraes et al. 2004a, p. 162, 164.

Recently *P. seychellensis* was regarded as a junior synonym of *P. orientalis* (= *P. multidentatus* Swirski & Shechter 1961) by Chant & McMurtry (2003). However, *P. seychellensis* is distinctive in having leg IV without spatulate to knobbed non-macrosetae, whereas in *orientalis* leg IV is provided with 1 spatulate non-macroseta each on femur, genu, tibia and basitarsus (Ehara 2002b, Ehara & Amano 2004).

*Specimen examined.* Cianjur: 1♀, 7-VIII-2004 (T. G.), on a fabaceous climbing plant.

*Distribution.* Seychelles, Sri Lanka, Indonesia (Java, new record; Sumatra), Australia.

#### Genus *Indoseiulus* Ehara 1982

*Indoseius* Ghai & Menon 1969, p. 347 (nec *Indoseius* Evans 1955, p. 107).

*Amblyseius (Indoseiulus)* Ehara 1982, p. 42; McMurtry & Moraes 1984, p. 29.

*Indoseiulus:* Moraes et al. 1986, p. 59; Denmark & Kolodochka 1993, p. 249; Ehara et al. 1994, p. 139; Ehara & Amano 1998, p. 48; Moraes et al. 2004a, p. 89; Ehara & Amano 2004, p. 24.

Type species: *Indoseius ricini* Ghai & Menon 1969, by original designation by Ghai & Menon (1969).

The genus *Indoseiulus* is distinctive in having the peritrematic shields of both sexes not fused anteriorly with the dorsal shield (Figs. 9, 11, 12, 21). Dorsal shield with caudal margin more or less concave. Seta S4 absent; setae Z1, S2, S5 and J2 present (Fig. 9). Sternal shield with posterior margin often ill-defined (Fig. 23). Ventrianal shield poorly sclerotized (Fig. 15), with 3 pairs of preanal setae (JV1, ZV2, JV2). One pair of metapodal shields present (Fig. 16). Four pairs of setae (ZV1, ZV3, JV4, JV5) surrounding ventrianal shield.

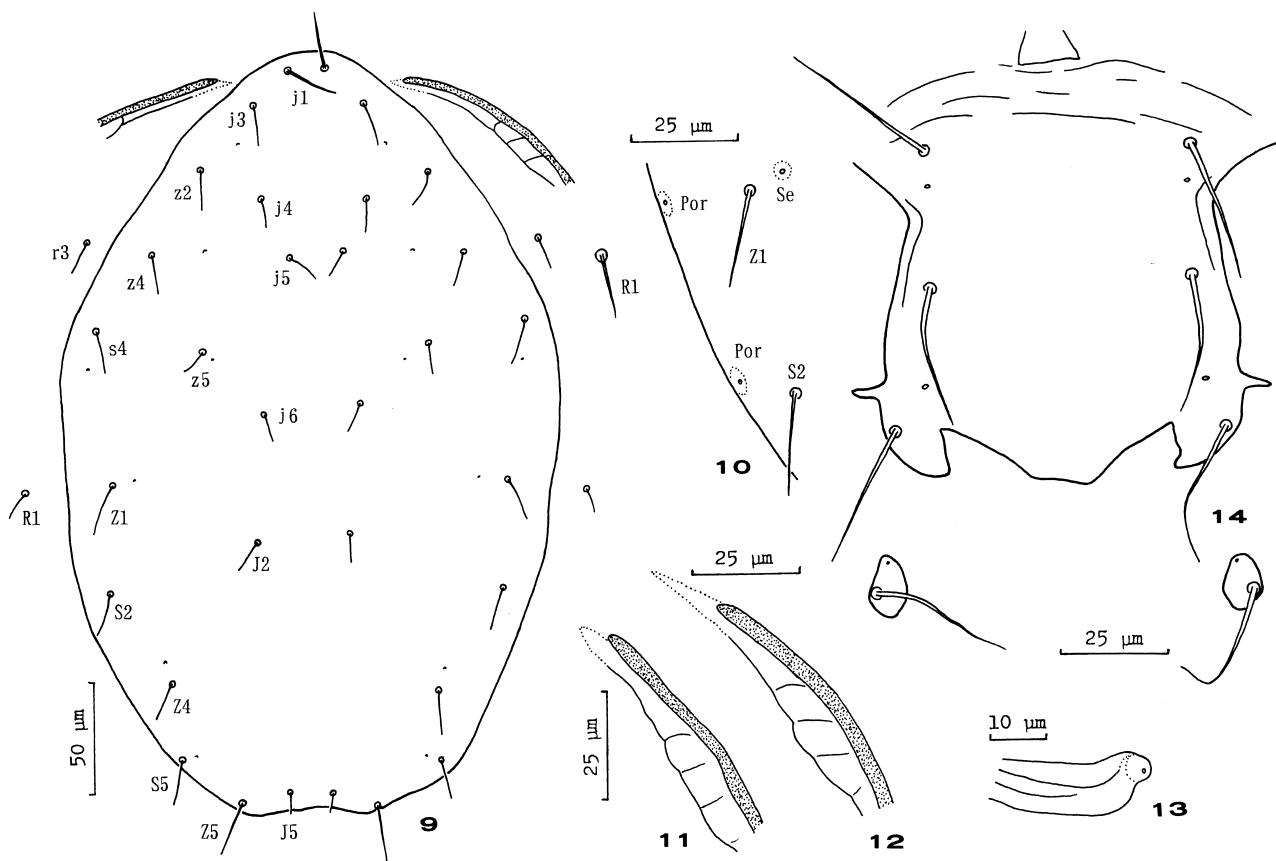
This genus is closely related to the genus *Macmurtryseius* Kolodochka & Denmark 1995 in that the peritrematic shields are not fused anteriorly with the dorsal shield, but differs from the latter in having seta S2 present and S4 absent.

#### *Indoseiulus armellae* (Schicha & Gutierrez 1985) (Figs. 9-20)

*Amblyseius armellae* Schicha & Gutierrez 1985, p. 175, figs. 17-21 (type loc.: Wau, Papua New Guinea; type habitat: *Musa* sp.); Schicha 1987, p. 118, pl. 73.

*Indoseiulus armellae:* Denmark & Kolodochka 1993, p. 252.

*Macmurtryseius armellae:* Moraes et al. 2004a, p. 97.



Figs. 9–14. *Indoseiulus armellae* (♀). — 9, dorsal shield; 10, Z1 and S2 area (Por, poroid; Se, solenostome); 11, 12, anterior termination of peritrematic shield; 13, posterior termination of peritrematic shield; 14, sternal shield.

**Female.** Dorsal shield (Figs. 9, 10) smooth, with 7 pairs of solenostomes. Dorsal idiosomal setae medium in length, smooth, mostly fine; j1 and Z5 stouter than other setae; r3 and R1 on interscutal membrane. Peritreme extending forward to level between j1 and j3; peritrematic shield with anterior termination poorly sclerotized, ill-defined (Figs. 11, 12); with posterior extension as illustrated (Fig. 13).

Sternal shield poorly sclerotized, with 3 pairs of setae; the posterior margin protruded medially (Fig. 14). Genital shield clearly defined. Ventrianal shield (Fig. 15) with 3 pairs of setae and pair of conspicuous solenostomes; anterior part of ventrianal shield poorly sclerotized, not clearly defined. Metapodal shields slender, not curved anterioly (Fig. 16). Spermathecal calyx long and tubular, very narrow except for distal, slightly flaring short portion; minor duct without basal dilated portion (Figs. 17, 18). Fixed digit of chelicera multidentate, movable digit tridentate (Fig. 19).

Chaetotaxic formula: genu II, 2-2/0, 2/0-1; genu III, 1-2/1, 2/0-1. Genua I and II each with 1 macroseta; leg III with macroseta each on genu and tibia; leg IV with macroseta each on genu, tibia and basitarsus; macrosetae on leg IV slightly dilated at distal end (Fig. 20).

Measurements (mean  $\pm$  SE, n=10): length of dorsal shield  $347 \pm 6$ , width of dorsal shield  $235 \pm 4$ ; lengths of setae: j1  $25.6 \pm 0.4$ , j3  $20.1 \pm 0.5$ , j4  $16.7 \pm 0.5$ , j5  $18.0 \pm$

$0.5$ , j6  $17.0 \pm 0.5$ , J2  $18.6 \pm 0.6$ , J5  $8.7 \pm 0.2$ , z2  $19.2 \pm 0.3$ , z4  $19.8 \pm 0.4$ , z5  $17.7 \pm 0.5$ , Z1  $22.4 \pm 0.4$ , Z4  $19.6 \pm 0.5$ , Z5  $30.0 \pm 0.6$ , s4  $21.7 \pm 0.3$ , S2  $22.6 \pm 0.6$ , S5  $22.5 \pm 0.4$ , r3  $19.1 \pm 0.7$ , R1  $19.6 \pm 0.3$ , JV5  $24.6 \pm 0.7$ ; macrosetae on leg IV: genu  $38.4 \pm 0.8$ , tibia  $43.7 \pm 0.8$ , basitarsus  $43.3 \pm 0.8$ .

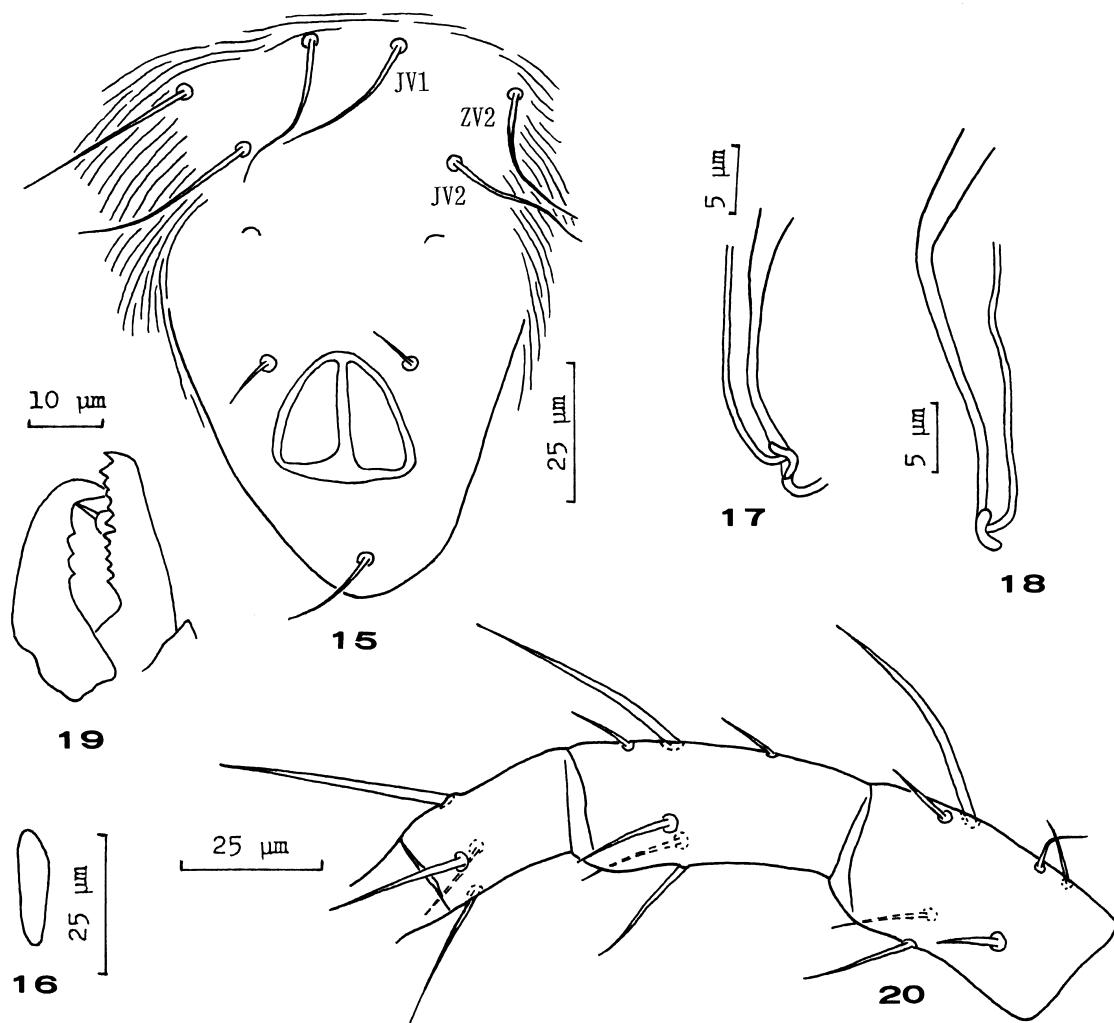
**Male.** Not known.

**Specimens examined.** Bogor: 2♀, 2–VIII–2004 (T. G.), on papaya, 3♀, 2–VIII–2004 (T. G.), on cassava, 6♀, 7–VIII–2004 (T. G.), on cassava; Parungkuda: 5♀, 7–VIII–2004 (T. G.), on cassava.

**Distribution.** Indonesia (Java), new record; Papua New Guinea.

**Remarks.** Previously *Indoseiulus armellae* was known only from a single female taken in Papua New Guinea. Setae R1 of the holotype were not observed by Schicha & Gutierrez (1985); but it is probable that the setae were lost artificially during the mounting. The setal measurements of the present materials strikingly accord with those of the original description of *armellae*.

This species closely resembles *I. liturivorus* (Ehara 1982) in having the chelicera with multidentate fixed digit. Denmark and Kolodochka (1993) considered that *I. armellae* is a junior synonym of *I. liturivorus*. However, it differs from *liturivorus* in that the minor duct of the spermatheca is devoid of a basal node (cf. Ehara 1982, figs.



Figs. 15–20. *Indoseiulus armellae* (♀). — 15, ventrianal shield; 16, right metapodal shield; 17, 18, spermatheca; 19, chelicera; 20, genu, tibia and basitarsus of leg IV.

14, 15), and seta j1 is longer than Z4.

*Indoseiulus santosoi* sp. nov.  
(Figs. 21–29)

**Diagnosis.** This species is similar to *I. semirregularis* Schicha & Corpuz-Raros 1992 from the Philippines in having the cup-shaped spermathecal calyx, but differs from the latter in the following points:

- 1) Seta r3 on intercutal membrane (on dorsal shield in *semirregularis*).
- 2) Ventrianal solenostomes very conspicuous (usual in *semirregularis*).
- 3) Anterior end of peritreme present anterior to base of seta j3 (present laterad of base of j3 in *semirregularis*).
- 4) Lengths of major dorsal setae: j1 27, Z5 21, and Z4 20 (j1 33, Z5 28, and Z4 25 in *semirregularis*).

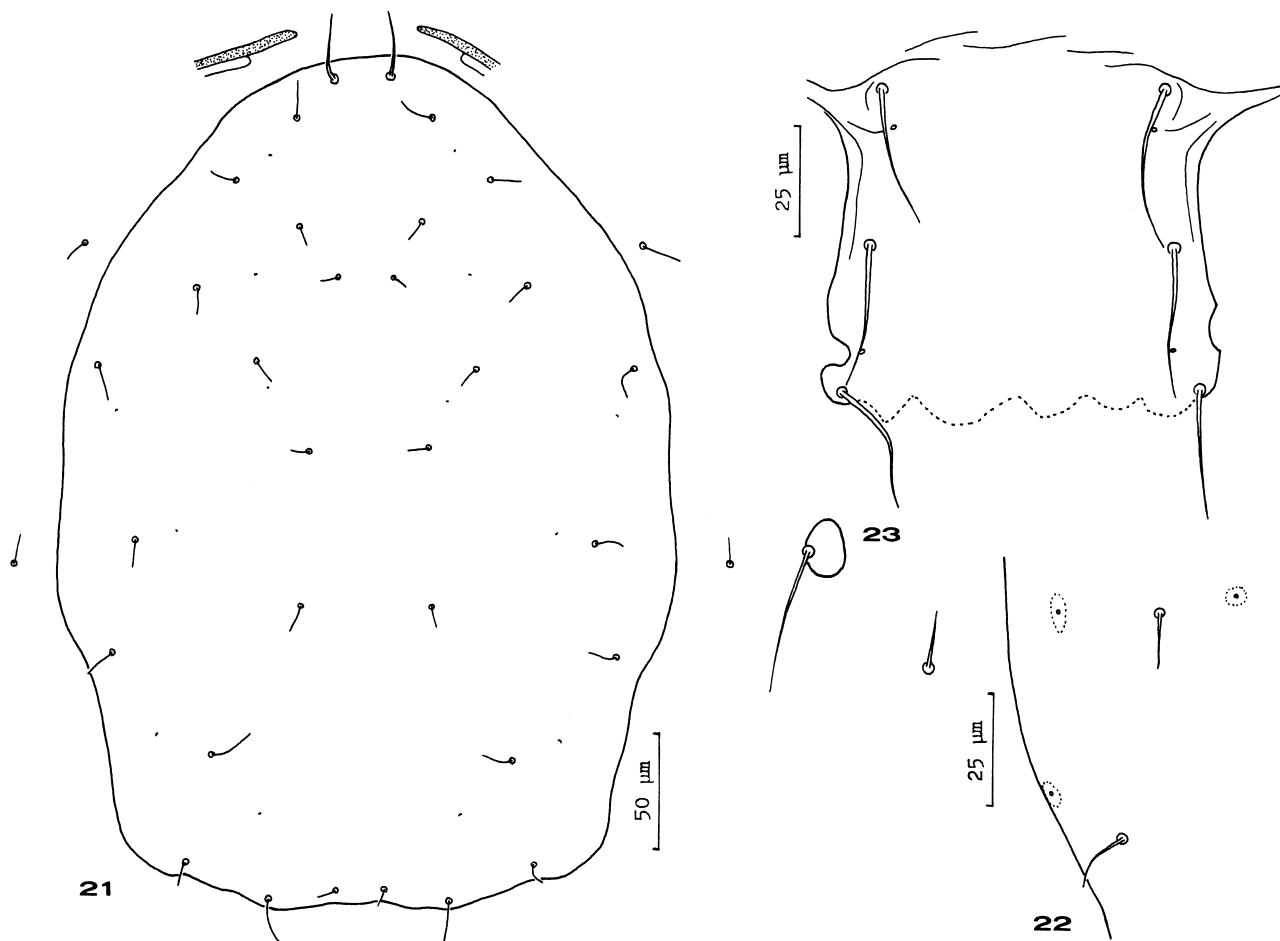
Further, a similar species *I. irregularis* (Evans 1953) from Malaysia is readily distinguished from the new species

in having the disc-shaped spermathecal calyx (Schicha 1981).

**Female.** Dorsal shield (Figs. 21, 22) smooth, with 7 pairs of solenostomes. Dorsal idiosomal setae short and fine, smooth; j1 the longest, stouter than other setae; r3 and R1 on intercutal membrane. Peritreme with anterior tip present cephalad of base of j3; posterior extension of peritrematic shield with termination very slender.

Sternal shield with 3 pairs of setae, with posterior margin not clearly defined, appearing to be indented (Fig. 23). Genital shield clearly defined (Fig. 24). Ventrianal shield (Fig. 25) with 3 pairs of preanal setae and pair of very conspicuous solenostomes; anterior part of ventrianal shield poorly sclerotized, not clearly defined. Metapodal shield with anterior termination curved and slender (Fig. 26). Spermatheca with calyx cup-shaped (Fig. 27). Chelicera not clearly observable because of angle; fixed digit not multideterminate.

Chaetotaxic formula: genu II, 2–2/0, 2/0–1; genu III, 1–



Figs. 21–23. *Indoseiulus santosoi* sp. nov. (♀, holotype). — 21, dorsal shield; 22, Z1 and S2 area; 23, sternal shield.

2/1, 2/0–1. Genu I with 2 macrosetae (Fig. 28), genu II with 1 macroseta; leg III with 1 macroseta each on genu and tibia; leg IV (Fig. 29) with 1 macroseta each on genu, tibia and basitarsus, macrosetae on leg IV barely knobbed.

Measurements (holotype): length of dorsal shield 363, width of dorsal shield 265; lengths of setae: j1 26.5, j3 16.8, j4 11.3, j5 11.1, j6 13.4, J5 7.8, z2 13.6, z4 14.6, z5 12.6, Z1 12.6, Z4 20.0, Z5 21.3, s4 19.0, S2 15.0, S5 13.7, r3 14.6, R1 15.0, JV5 44.2, macrosetae on leg IV: genu 54.5, tibia 43.0, basitarsus 49.9.

*Male.* Not known.

*Holotype.* ♀ (MZB), Cianjur, West Java, 28–VII–2004 (S. Santoso), on a fabaceous climbing plant.

*Etymology.* This species is named in honor of Dr. Sugeng Santoso, Bogor Agricultural University.

#### Subfamily PHYTOSEIINAE Berlese

*Phytoseius (Dubininellus) rachelae* Swirski & Shechter 1961

*Phytoseius (Dubininellus) rachelae* Swirski & Shechter 1961, p. 108, figs. 17–19 (type loc.: Sai Kung, New Territories, Hong

Kong; type habitat: *Rhus chinensis* Mill.); Swirski & Amitai 1966, p. 15, figs. 7–9; Amitai & Swirski 1966, p. 21, fig. 6a–c; Denmark 1966, p. 62, fig. 25; Ehara 2002b, p. 131, fig. 15. *Phytoseius (Phytoseius) rachelae*: Ehara & Lee 1971, p. 72, figs. 42–47; Moraes et al. 1986, p. 226.

*Phytoseius rachelae*: Moraes et al. 2004a, p. 253.

This species may be recognized by the smooth dorsal shield and the relative lengths of main dorsal body setae, and by the shape of the spermatheca.

*Specimens examined.* Cianjur: 16♀ & 2♂, 7–VIII–2004 (T. G.), on a fabaceous climbing plant.

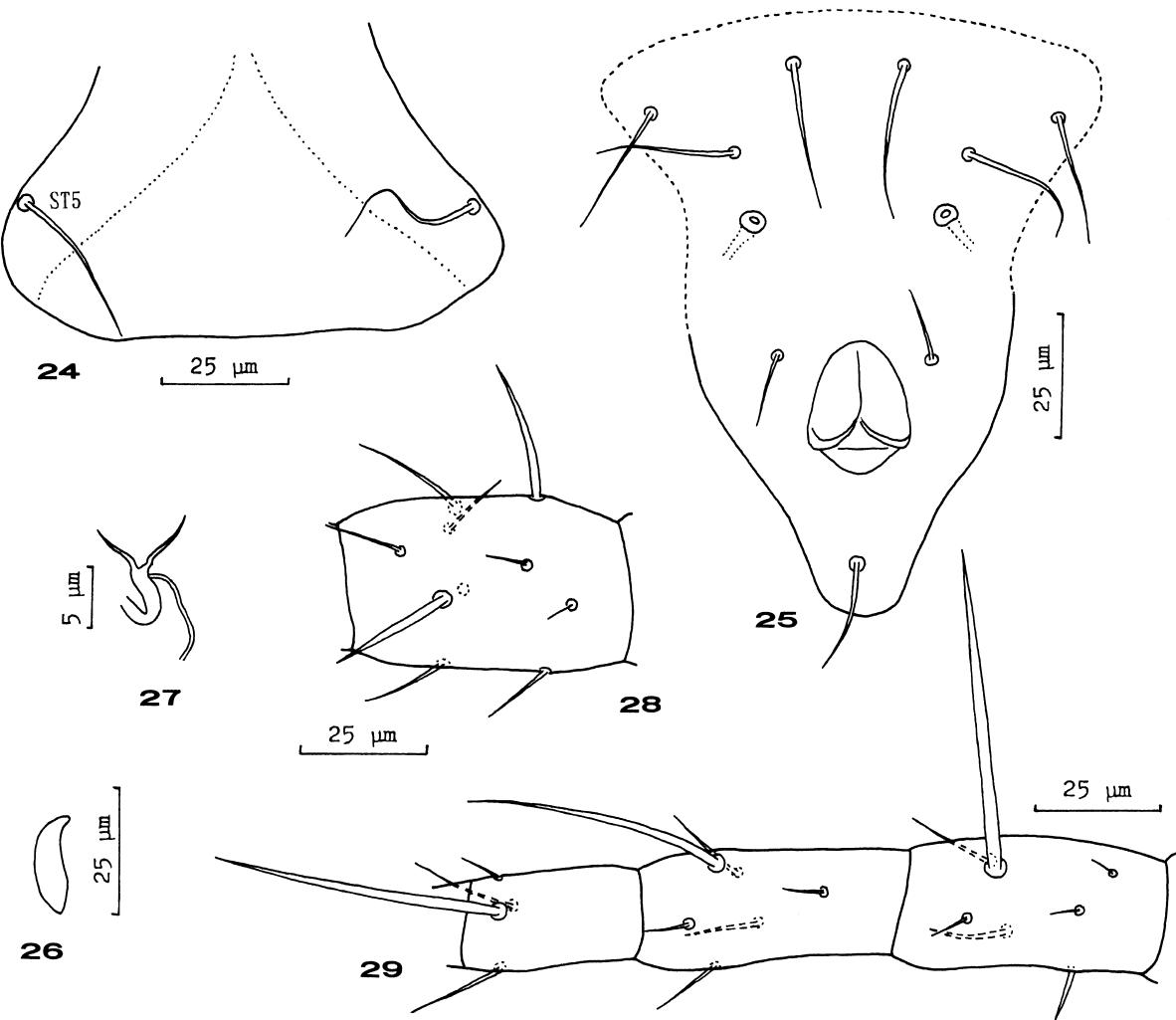
*Distribution.* China, Indonesia (Java, new record; Sumatra), India.

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Figs. 24–29. *Indoseiulus santosoi* sp. nov. (♀, holotype). — 24, genital shield; 25, ventrianal shield; 26, left metapodal shield; 27, spermatheca; 28, genu I; 29, genu, tibia and basitarsus of leg IV.

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